

Serial No. 10/762,559
Docket No. K06-165935M/TBS

2

AMENDMENTS TO THE CLAIMS:

Please amend the claims as follows:

1. (Currently Amended) A steel for use in a high strength pinion shaft comprising:
0.45wt% - 0.55wt% C;
0.10wt% - 0.50wt% Si;
0.50wt% - 1.20wt% Mn;
0.025wt% or less P;
0.025wt% or less S;
0.15wt% - 0.25wt% Mo;
0.0005wt% - 0.005wt% B;
0.005wt% - 0.010wt% Ti;
0.015wt% or less N; and
the a balance comprising Fe and impurities,
wherein the steel comprises a 3-phase texture of ferrite + pearlite + bainite,
wherein $0.80 \leq Ceq \leq 0.95$, where $Ceq = C + 0.07 \times Si + 0.16 \times Mn + 0.20 \times Cr +$
 $0.72 \times Mo$, and
wherein $f \text{ value} \leq 1.0$, where $f \text{ value} = 1.78 - 3.2 \times C + 0.05 \times Si - 0.60 \times Mn - 0.55 \times Cu -$
 $0.80 \times Ni - 0.75 \times Cr$.
2. (Previously Presented) A steel for use in a high strength pinion shaft according to claim 1, further comprising one or more of 0.50wt% or less Cu, 0.50wt% or less Ni and 0.50wt% or less Cr instead of a portion of said Fe.

Serial No. 10/762,559

3

Docket No. K06-165935M/TBS

3. (Previously Presented) A steel for use in a high strength pinion shaft according to claim 1, further comprising one or more of 0.20wt% or less Nb, 0.20wt% or less Ta, 0.10wt% or less Zr and 0.10wt% or less Al instead of a portion of said Fe.
4. (Previously Presented) A steel for use in a high strength pinion shaft according to claim 2, further comprising one or more of 0.20wt% or less Nb, 0.20wt% or less Ta, 0.10wt% or less Zr and 0.10wt% or less Al instead of a portion of said Fe.
5. (Currently Amended) A steel for use in a high strength pinion shaft comprising:
- 0.45wt% - 0.55wt% C;
 - 0.10wt% - 0.50wt% Si;
 - 0.50wt% - 1.20wt% Mn;
 - 0.025wt% or less P;
 - 0.025wt% or less S;
 - 0.15wt% - 0.25wt% Mo;
 - 0.0005wt% - 0.005wt% B;
 - 0.005wt% - 0.010wt% Ti;
 - 0.015wt% or less N; and
- the a balance comprising Fe and impurities,
- wherein the steel, having been hot rolled, ~~after hot rolling~~ comprises a 3-phase texture of ferrite + pearlite + bainite,
- wherein the a ferrite area ratio is 40% or less,
- wherein the a maximum pearlite block size is 100 μ m or less in a circle-equivalent diameter,
- wherein the a hardness after hot rolling is 24 to 30 HRC,

Serial No. 10/762,559
Docket No. K06-165935M/TBS

4

wherein the a surface hardness after high frequency hardening is 650 HV or higher,
and

wherein the an old austenite crystal grain size in the a hardened layer is 8 or more in
view of grain size number,

wherein $0.80 \leq Ceq \leq 0.95$, where $Ceq = C + 0.07 \times Si + 0.16 \times Mn + 0.20 \times Cr +$
 $0.72 \times Mo$, and

wherein $f \text{ value} \leq 1.0$, where $f \text{ value} = 1.78 - 3.2 \times C + 0.05 \times Si - 0.60 \times Mn - 0.55 \times Cu -$
 $0.80 \times Ni - 0.75 \times Cr$.

6. (Previously Presented) A steel for use in a high strength pinion shaft according to
claim 5, further comprising one or more of 0.50wt% or less Cu, 0.50wt% or less Ni and
0.50wt% or less Cr instead of a portion of said Fe.

7. (Previously Presented) A steel for use in a high strength pinion shaft according to
claim 5, further comprising one or more of 0.20wt% or less Nb, 0.20wt% or less Ta, 0.10wt%
or less Zr and 0.10wt% or less Al instead of a portion of said Fe.

8. (Previously Presented) A steel for use in a high strength pinion shaft according to
claim 6, further comprising one or more of 0.20wt% or less Nb, 0.20wt% or less Ta, 0.10wt%
or less Zr and 0.10wt% or less Al instead of a portion of said Fe.

9. (Currently Amended) A method of manufacturing a steel for use in a high strength
pinion shaft in which a steel comprising:

0.45wt% - 0.55wt% C;

0.10wt% - 0.50wt% Si;

Serial No. 10/762,559
Docket No. K06-165935M/TBS

5

0.50wt% - 1.20wt% Mn;

0.025wt% or less P;

0.025wt% or less S;

0.15wt% - 0.25wt% Mo;

0.0005wt% - 0.005wt% B;

0.005wt% - 0.010wt% Ti;

0.015wt% or less N; and

the a balance comprising Fe and impurities, is fabricated or worked under a draft ratio at an area reduction of 10% or more, and at a temperature of 850°C or lower,

wherein $0.80 \leq C_{eq} \leq 0.95$, where $C_{eq} = C + 0.07 \times Si + 0.16 \times Mn + 0.20 \times Cr + 0.72 \times Mo$, and

wherein $f \text{ value} \leq 1.0$, where $T_{Tr} = 2.78 - 3.2 \times C + 0.05 \times Si - 0.60 \times Mn - 0.55 \times Cu - 0.80 \times Ni - 0.75 \times Cr$,

said method comprising hot rolling said steel to obtain a steel comprising a 3-phase texture of ferrite + pearlite + bainite.

10. (Previously Presented) A method of manufacturing a steel for use in a high strength pinion shaft according to claim 9, further comprising one or more of 0.50wt% or less Cu, ~~Ni~~ 0.50wt% or less Ni and 0.50wt% or less Cr instead of a portion of said Fe.

11. (Previously Presented) A method of manufacturing a steel for use in a high strength pinion shaft according to claim 9, further comprising one or more of 0.20wt% or less Nb, 0.20wt% or less Ta, 0.10wt% or less Zr and 0.10wt% or less Al instead of a portion of said Fe.

Serial No. 10/762,559

6

Docket No. K06-165935M/TBS

12. (Previously Presented) A method of manufacturing a steel for use in a high strength pinion shaft according to claim 10, further comprising one or more of 0.20wt% or less Nb, 0.20wt% or less Ta, 0.10wt% or less Zr and 0.10wt% or less Al instead of a portion of said Fe.
13. (Previously Presented) A steel for use in a high strength pinion shaft according to claim 1, wherein a ferrite ratio of said steel comprises 40% or less.
14. (Previously Presented) A steel for use in a high strength pinion shaft according to claim 1, wherein a hardness of said steel after hot rolling comprises a range of 24 HRC to 30 HRC.
15. (Previously Presented) A steel for use in a high strength pinion shaft according to claim 1, wherein a surface hardness of said steel comprises 650 HV or more.
16. (Previously Presented) A steel for use in a high strength pinion shaft according to claim 1, wherein said steel comprises an old austenite crystal grain size of 8 or more.
17. (Currently Amended) A method of manufacturing a steel for use in a high strength pinion shaft according to claim 9, wherein said steel is fabricated or ~~work~~ worked under a temperature in a range of 700 °C to 850 °C.
18. (Previously Presented) A steel for use in a high strength pinion shaft according to claim 1, wherein a torsional strength of said steel comprises 1670 Mpa to 1800 Mpa.

Serial No. 10/762,559

7

Docket No. K06-165935M/TBS

19. (Previously Presented) A steel for use in a high strength pinion shaft according to claim 1, wherein a wear loss of said steel comprises 0.002g to 0.004g.